

IN THE CLAIMS

Please cancel claims 2, 5, 8, 9, 18, 19, 24, 27, 30 and 31, without prejudice or disclaimer, amend claims 1, 3, 4, 6 thru 10, 12 thru 23, 25, 26 and 28 thru 34, and add claims 35 thru 46, as follows:

1     1. (Currently Once Amended) A cathode for an electron tube, comprising:  
2         a metal base; and  
3         an electron-emitting material layer coated on the metal base, said electron-  
4     emitting material layer comprising a needle-shaped conductive material;  
5         said needle-shaped conductive material being at least one material selected from a  
6     group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium,  
7     molybdenum and platinum.

Claim 2. (Canceled)

1         3. (Currently Once Amended) The cathode of claim 1, ~~further comprised of~~ said  
2     needle-shaped conductive material being a carbonaceous material.

1     4. (Currently Once Amended) [[The]] A cathode of claim 3, further comprised of  
2     for an electron tube, comprising:  
3         a metal base; and

4        an electron-emitting material layer coated on the metal base, said electron-  
5        emitting material layer comprising a needle-shaped conductive material;

6        said needle-shaped conductive material being a carbonaceous material ~~[[being]]~~  
7        selected from the group consisting essentially of a carbon nanotube, carbon fiber and  
8        graphite fiber.

1        5. (Currently Once Amended) The cathode of claim 3, ~~further comprised of~~ said  
2        carbonaceous material being a carbon nanotube.

1        6. (Currently Once Amended) ~~[[The]] A cathode of claim 1, further comprised of~~  
2        for an electron tube, comprising:

3        a metal base; and

4        an electron-emitting material layer coated on the metal base, said electron-  
5        emitting material layer comprising a needle-shaped conductive material;

6        said needle-shaped conductive material in the electron-emitting material layer  
7        being in ~~[[the]]~~ a range of 0.01 to 30% by weight based on ~~[[the]]~~ a total weight of said  
8        electron-emitting material.

1        7. (Currently Once Amended) The cathode of claim 1, ~~further comprised of~~ said  
2        needle-shaped conductive material being a carbonaceous material, said needle-shaped  
3        conductive material being in ~~[[the]]~~ a range of 0.01 to 30% by weight based on ~~[[the]]~~ a

4 total weight of said electron-emitting material layer, and ~~[[the]]~~ a thickness of said  
5 electron-emitting material layer being in ~~[[the]]~~ a range of 30 to 80  $\mu\text{m}$ .

Claims 8 and 9. (Canceled)

1 10. (Currently Once Amended) A cathode for an electron tube, comprising:  
2 a metal base; and  
3 an electron-emitting material layer coated on the metal base, said electron-  
4 emitting material layer comprising a needle-shaped conductive material and having a  
5 surface roughness corresponding to a distance between ~~[[the]]~~ a highest point and ~~[[the]]~~  
6 a lowest point on ~~[[the]]~~ a surface of the electron-emitting material layer being less than  
7 10 microns.

1 11. (Original) The cathode of claim 10, wherein said cathode is an oxide cathode.

1 12. (Currently Once Amended) The cathode of claim ~~[[11]]~~ 10, ~~further comprised~~  
2 of said needle-shaped conductive material being at least one material selected from the  
3 group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium,  
4 molybdenum and platinum.

1 13. (Currently Once Amended) The cathode of claim ~~[[11]]~~ 10, ~~further comprised~~

2 of said needle-shaped conductive material being a carbonaceous material.

1 14. (Currently Once Amended) The cathode of claim 13, ~~further comprised of~~  
2 said carbonaceous material being selected from the group consisting essentially of a  
carbon nanotube, carbon fiber and graphite fiber.

1 15. (Currently Once Amended) The cathode of claim 13, ~~further comprised of~~  
2 said carbonaceous material being a carbon nanotube.

1 16. (Currently Once Amended) The cathode of claim ~~[[11]] 10~~, ~~further comprised~~  
2 of said needle-shaped conductive material in the electron-emitting material layer being in  
3 ~~[[the]] a~~ range of 0.01 to 30% by weight based on ~~[[the]] a~~ total weight of said electron-  
4 emitting material.

1 17. (Currently Once Amended) The cathode of claim ~~[[11]] 10~~, ~~further comprised~~  
2 of said needle-shaped conductive material being a carbonaceous material, said needle-  
3 shaped conductive material being in ~~[[the]] a~~ range of 0.01 to 30% by weight based on  
4 ~~[[the]] a~~ total weight of said electron-emitting material layer, and the thickness of said  
5 electron-emitting material layer being in ~~[[the]] a~~ range of 30 to 80  $\mu\text{m}$ .

Claims 18 and 19. (Canceled)

1           20. (Currently Once Amended) The cathode of claim 11, further comprising a  
2 metal layer including nickel grains having sizes smaller than ~~[[the]]~~ sizes of grains in said  
3 metal base, said metal layer being formed between said metal base and said electron-  
4 emitting material layer.

1           21. (Currently Once Amended) The cathode of claim 20, ~~further comprised of~~  
2 said metal layer further including at least one metal selected from the group consisting  
3 essentially of aluminum (Al), tungsten (W), tantalum (Ta), chromium (Cr), magnesium  
4 (Mg), silicon (Si) and zirconium (Zr).

1           22. (Currently Once Amended) The cathode of claim 20, ~~further comprised of the~~  
2 a thickness of said metal layer being in ~~[[the]]~~ a range of 1 to 30  $\mu$ m.

1           23. (Currently Once Amended) An oxide cathode for an electron tube,  
2 comprising:

3           a metal base; and

4           an electron-emitting material layer coated on the metal base, said electron-  
5 emitting material layer comprising a needle-shaped conductive material;

6           said needle-shaped conductive material being at least one material selected from a  
7 group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium.

8 molybdenum and platinum

Claim 24. (Canceled)

1 25. (Currently Once Amended) The cathode of claim 23, ~~further comprised of~~  
2 said needle-shaped conductive material being a carbonaceous material.

1 26. (Currently Once Amended) [[The]] An oxide cathode ~~of claim 25, further~~  
2 ~~comprised of for an electron tube, comprising:~~

3 a metal base; and

4 an electron-emitting material layer coated on the metal base, said electron-  
5 emitting material layer comprising a needle-shaped conductive material;

6 said carbonaceous material being selected from [[the]] a group consisting  
7 essentially of a carbon nanotube, carbon fiber and graphite fiber.

1 27. (Currently Once Amended) The cathode of claim 25, ~~further comprised of~~  
2 said carbonaceous material being a carbon nanotube.

1 28. (Currently Once Amended) [[The]] An oxide cathode ~~of claim 23, further~~  
2 ~~comprised of for an electron tube, comprising:~~

3 a metal base; and

4        an electron-emitting material layer coated on the metal base, said electron-  
5        emitting material layer comprising a needle-shaped conductive material:

6        said needle-shaped conductive material in the electron-emitting material layer  
7        being in ~~[[the]]~~ a range of 0.01 to 30% by weight based on ~~[[the]]~~ a total weight of said  
8        electron-emitting material.

1        29. (Currently Once Amended) The cathode of claim 23, ~~further comprised of~~  
2        said needle-shaped conductive material being a carbonaceous material, said needle-  
3        shaped conductive material being in ~~[[the]]~~ a range of 0.01 to 30% by weight based on  
4        ~~[[the]]~~ a total weight of said electron-emitting material layer, and ~~[[the]]~~ a thickness of  
5        said electron-emitting material layer being in ~~[[the]]~~ a range of 30 to 80  $\mu$ m.

Claims 30 and 31. (Canceled)

1        32. (Currently Once Amended) The cathode of claim 23, further comprising a  
2        metal layer including nickel grains having sizes smaller than ~~[[the]]~~ sizes of grains in said  
3        metal base, said metal layer being formed between said metal base and said electron-  
4        emitting material layer.

1        33. (Currently Once Amended) The cathode of claim 32, ~~further comprised of~~  
2        said metal layer further including at least one metal selected from the group consisting

3 essentially of aluminum (Al), tungsten (W), tantalum (Ta), chromium (Cr), magnesium  
4 (Mg), silicon (Si) and zirconium (Zr) .

1 34. (Currently Once Amended) The cathode of claim 32, ~~further comprised of the~~  
2 a thickness of said metal layer being in ~~[[the]]~~ a range of 1 to 30 $\mu$ m.

1 35. (New) A method of preparing a cathode for an electron tube, comprising the  
2 steps of:

3 providing a metal base;

4 preparing a carbonate paste containing needle-shaped conductive material; and

5 coating the carbonate paste containing the needle-shaped conductive material onto  
6 the metal base, and then drying to form an electron-emitting layer of the cathode.

1 36. (New) The method of claim 35, wherein the coating step includes applying  
2 pressure on a coating layer in order to attain a desired level of surface roughness.

1 37. (New) The method of claim 36, wherein the step of applying the pressure on  
2 the coating layer comprises at least one of printing, electrodeposition and painting.

1 38. (New) The method of claim 37, wherein the printing includes at least one of  
2 screen printing and roll coating.



1           39. (New) The method of claim 35, wherein the coating step comprises coating to  
2 a thickness in a range of 30 to 80 microns so as to obtain good electron emission  
3 characteristics.

1           40. (New) The method of claim 35, said needle-shaped conductive material in the  
2 electron-emitting material layer being in a range of 0.01 to 30% by weight based on a  
3 total weight of said electron-emitting material.

1           41. (New) The method of claim 35, further comprising the step, between the  
2 providing step and the coating step, of forming a metal layer on the metal base.

1           42. (New) The method of claim 41, wherein the metal layer comprises nickel and  
2 a refractory metal to reinforce mechanical strength of the cathode.

1           43. (New) The method of claim 41, further comprising the step, prior to forming  
2 the metal layer on the metal base, of mixing nickel powder and at least one of tungsten  
3 and aluminum as a reducing agent to prepare a metal layer material.

1           44. (New) The method of claim 43, further comprising the step, after the mixing  
2 step, of homogeneously mixing the metal layer material with an organic binder and a

3 liquid-phase organic solvent to prepare a paste which, when deposited on the metal base,  
4 forms the metal layer on the metal base.

1 45. (New) The method of claim 41, wherein the forming step comprises applying  
2 metal layer material to the metal base, and then thermally treating the applied metal layer  
3 material in one of a vacuum and an inert gas atmosphere to obtain the metal layer without  
4 organic matter.

1 46. (New) The method of claim 41, wherein the forming step comprises one of  
2 printing, spraying, electrodeposition and painting.

1 47. (New) A cathode prepared by the method of claim 35.